

A previously undescribed following association between juvenile dusky grouper, *Epinephelus marginatus* (Serranidae) and *Octopus vulgaris*

by

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RÉSUMÉ. - Première description d'une association entre un juvénile d'*Epinephelus marginatus* (Serranidae) suivant un *Octopus vulgaris*.

Au cours d'un échantillonnage systématique dans une zone intertidale à l'île Terceira, Açores, Atlantique NE, un spécimen juvénile d'*Epinephelus marginatus* (15 cm LT) a été observé, suivant, pendant 6 minutes, un *Octopus vulgaris* (30 cm de rayon) pendant que celui-ci cherchait, avec l'aide de ses bras, des proies parmi les pierres. Cette observation est la première description d'une association de ce type entre un mérour brun et un poulpe, connu plutôt comme proie habituelle de mérous de plus grosse taille.

Key words. - Serranidae - Octopodidae - *Epinephelus marginatus* - *Octopus vulgaris* - ASE - Azores - Following associations - Grouper - Octopus - Prey.

Following associations involving Serranidae species are relatively frequent. These inquisitive fishes are able to learn such behaviours, which probably benefit their trophic possibilities and feeding efficiency as follower species, (Diamant and Shpiegel, 1985).

Serranids are known followers of several teleosts, mainly moray and snake eels (Karplus, 1978; Diamant and Shpiegel, 1985; Strand, 1988; Barreiros and Santos, 1998) and also some invertebrates such as sea stars (Gibran, 2002) and octopi (Diamant and Shpiegel, 1985). However, following behaviour of juvenile *Epinephelus marginatus* (Lowe, 1834) was only recently recorded for the first time by Gerhardinger *et al.* (2006), who reported the snake eel *Myrichthys ocellatus* (Lesueur, 1825) as the nuclear predator.

This paper registers, for the first time, a following association between a juvenile *E. marginatus* with an invertebrate acting as the nuclear species. The juvenile dusky grouper (about 15 cm TL) was observed following a small *Octopus vulgaris* Lamarck 1798 (about 30 cm radial extension). This following behaviour was observed only once in December 2006, during a visual census sampling in a shallow rocky tidal pool (about 2 m depth) from North Terceira Island, Azores Archipelago, NE Atlantic. Water temperature was 16°C.

The following behaviour had begun before our observation, and lasted for a further 6 min. When we detected the association, the fish was already laterally observing the nuclear species, keeping a fixed distance of ca. 10 cm. During the observation period, the nuclear species stayed permanently near the bottom trying to capture prey by moving pebbles with its arms and also extending them through narrow spaces and rocky crevices. The follower stayed attentive all the time keeping its head almost always directed to the

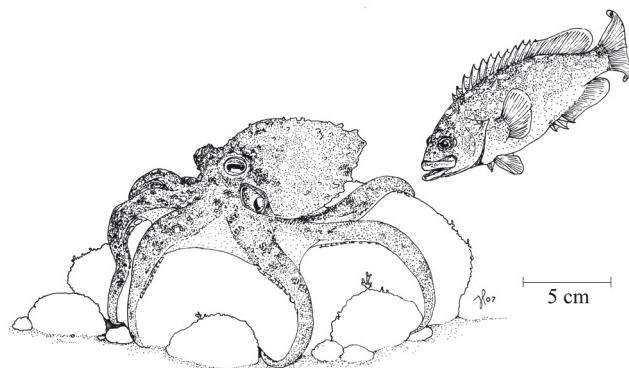


Figure 1. - The follower *Epinephelus marginatus* moving around the *Octopus vulgaris* while the octopus was exploring rocks with its arms probing for prey. Terceira Island, Azores, NE Atlantic. Illustration by JPB based on underwater sketches and field observations. [Juvénile d'*E. marginatus* se déplaçant autour de l'*O. vulgaris* pendant que celui-ci cherchait des proies avec ses bras. Île de Terceira, Açores, Atlantique NE. Dessin de JPB d'après un croquis réalisé en plongée sous-marine].

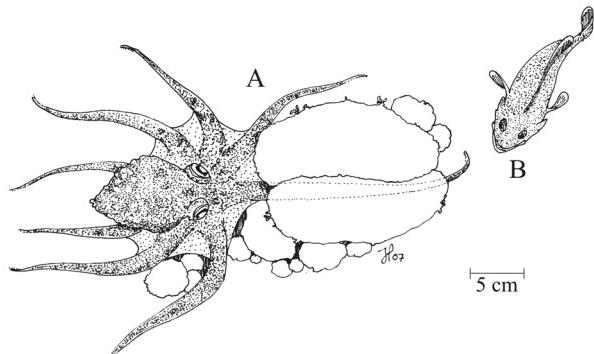


Figure 2. - The follower *Epinephelus marginatus* positioned in front of a small hole (after moving from position A to position B) while the octopus probed the crevice with one arm, which almost touched the grouper's snout. Terceira Island, Azores, NE Atlantic. Illustration by JPB based on underwater sketches and field observations. [Juvénile d'*E. marginatus* se positionnant (après s'être déplacé de la position A vers la position B) devant le trou inspecté d'un seul bras par l'*O. vulgaris* qui touchait presque la bouche du mérour. Île de Terceira, Açores, Atlantique NE. Dessin de JPB d'après un croquis réalisé en plongée sous-marine].

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octopus flanks. It kept a distance of ca. 15 cm from the bottom while keeping with it an angle of approximately 45° (Fig. 1). The young grouper, although constantly changing its observation point, maintained the above mentioned stances. These movements are interpreted by us as a way to look for a better charging opportunity whenever a possible prey would eventually appear. This position by the flanks of the nuclear species only changed twice when the follower moved to observe the opposite side of a hole that the octopus was probing with its arms, almost touching the nose of the grouper (Fig. 2).

Although both follower and nuclear became very close to each other no biting, or rubbing, mentioned, respectively by Gibran (2002) and Dubin (1982) were ever observed. This absence of physical contact could be interpreted as a serranid appeasement behaviour similar to that referred by other authors (e.g. Diamant and Shpiegel, 1985; Barreiros 1998) while octopi tend to retreat to some shelter when touched (pers. obs.).

Following behaviour activities are generally considered as a symbiotic association beneficial to the follower species, which gains access to otherwise unavailable prey, or which would have to spend a lot more effort and energy to expose their prey (Diamant and Shpiegel, 1985; Strand, 1988; Gibran, 2002; Soares and Barreiros, 2003; Gerhardinger *et al.*, 2006). In this case of a juvenile grouper following a subadult octopus, the association may involve both a competition stress as well as a predation risk to the nuclear species, something that does not appear to happen in the case reported by Gerhardinger *et al.* (2006).

Azevedo *et al.* (1995) clearly show crabs as dominant prey of juvenile dusky groupers (13 to 25 cm TL) both in number (53.2%) and in weight (69.1%). According to Gonçalves (1993) crabs are also the major prey item for Azorean octopi. Although previous publications report that the follower species only takes prey that escape the nuclear predator (Diamant and Shpiegel 1985; Gerhardinger *et al.*, 2006), future observations of this or other associations involving dusky groupers may corroborate the Karplus (1978) observation of "stealing" prey by the congeneric *Epinephelus fasciatus* (Forsskål, 1775).

The risk of *O. vulgaris* becoming prey, when associated to *E. marginatus*, is reduced when the grouper is small, but the activity of following a nuclear predator may also attract the attention of other larger predators (it did call our full attention).

New following associations between serranids and bottom-dwelling invertebrates are being described with some frequency. We agree with Gibran (2002) and Gerhardinger *et al.* (2006) that such behaviours are poorly known.

REFERENCES

- AZEVEDO J.M.N., RODRIGUES J.B., MENDIZABAL M. & L.M. ARRUDA, 1995. - Study of a sample of dusky groupers, *Epinephelus marginatus* (Lowe, 1834), caught in a tide pool at Lajes do Pico, Azores. *Bol. Mus. Mun. Funchal.*, 4: 55-64.
- BARREIROS J.P. & R.S. SANTOS, 1998. - Notes on the food habits and predatory behaviour of the dusky grouper, *Epinephelus marginatus* (Lowe, 1834) (Pisces: Serranidae) in the Azores. *Arquipélago Life Mar. Sci.*, 16A: 29-35.
- BARREIROS J.P., 1998. - Inversão sexual em *Epinephelus marginatus* (Lowe, 1834) (Pisces: Serranidae, Epinephelinae) nos Açores. *Rev. Port. Zootec.*, 5(1): 81-90.
- DIAMANT A. & M. SHPIEGEL, 1985. - Interspecific feeding associations of groupers (Teleostei: Serranidae) with octopuses and moray eels in the Gulf of Eilat (Agaba). *Environ. Biol. Fish.*, 13(2): 153:159.
- DUBIN R.E., 1982. - Behavioral interactions between Caribbean reef fish and eels (Muraenidae and Ophichthidae). *Copeia*, 1982(1): 229-232.
- GERHARDINGER L.C., HOSTIM-SILVA M., SAMAGAIA R. & J.P. BARREIROS, 2006. - A following association between juvenile *Epinephelus marginatus* (Serranidae) and *Myrichthys ocellatus* (Ophichthidae). *Cybium*, 30(1): 82-84.
- GIBRAN F.Z., 2002. - The sea basses *Diplectrum formosum* and *D. radiale* (Serranidae) as followers of the sea star *Luidia senegalensis* (Asteroidea) in southeastern Brasil. *Braz. J. Biol.*, 62(4A): 591-594.
- GONÇALVES J.M., 1993. - *Octopus vulgaris* Cuvier, 1797 (polvo-comum): Sinopse da biologia e exploração. "APCC" Thesis [Master thesis equivalent], 470 p. Univ. of the Azores, Department of Oceanography and Fisheries, Portugal.
- KARPLUS I., 1978. - A feeding association between the Grouper *Epinephelus fasciatus* and the moray eel *Gymnothorax griseus*. *Copeia*, 1978(1): 164.
- SOARES M.S.C. & J.P. BARREIROS, 2003. - Following associations with the striped red mullet *Mullus surmuletus* Linnaeus, 1758 (Perciformes: Mullidae) from the Azores. *Aqua - J. Ichthyol. Aquat. Biol.*, 7(3): 103-108.
- STRAND S., 1988. - Following behavior: Interspecific foraging associations among Gulf of California Reef Fishes. *Copeia*, 1988(2): 351-357.

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